



STUDY OF RIGHT VENTRICULAR SYSTOLIC PRESSURE IN SEVERE ANAEMIA PRE AND POST TRANSFUSION

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KEY WORDS :

ABSTRACT:

Background: Anaemia affects more than third of the world's population and contributes to increased morbidity, mortality and decreased quality of life. Global anaemia prevalence was 30% in women of reproductive age. Iron deficiency is one of the leading contributors to the burden of disease, and particularly affects children and reproductive age women. It is the most common nutritional deficiency in developed and developing regions of the world. Approximately 12% of adult men and 54% of adult women in India have iron deficiency. **Aim:** To study the right ventricular systolic pressure in severe anaemia pre and post transfusion **Materials And Methods:** A Hospital-based prospective study was conducted in the Department of General Medicine, Dr PSIMS & RF hospital for six months. A total of 33 cases with severe anaemia cases were admitted to the hospital during this period were taken into the study. **Results:** Among the selected patients, most patients were belonging to the age group of 41-50 years (27.3%). Most females were suffering from severe anaemia (72.7%). Male : female ratio was 0.37 :1. There was highly significant statistical difference in the subject distribution on the basis of venous hum (p value: 0.001). Most subjects were suffering from clinically severe anaemia, (57.6%). Most subjects in the group were iron deficient.(51.51%). There was a highly significant statistical difference in the subject distribution on the basis of right ventricular systolic pressure. (p value: 0.001). Majority of patients are with mild pulmonary hypertension (62.5%), followed by moderate hypertension (25%). Decrease in RVSP is observed in 90% of cases after PRBC transfusion. **Conclusion:** Severe anaemia leads to increase in LV muscular mass, left ventricular internal dimension which includes- systole, left ventricular internal dimension-diastole right ventricular systolic pressure, right ventricular internal dimension-systole, right ventricular internal dimension-diastole all suggestive of volume overload condition. All these changes are reversible after packed red blood cell transfusion.

INTRODUCTION:

Anaemia is a condition in which haemoglobin (Hb) concentration and/or RBC numbers are lower than normal and insufficient to meet an individual's physiological needs. According to the World Health Organization (WHO), anaemia is defined as haemoglobin levels less than 12.0 g/dL in women and less than 13.0 g/dL in men. Pulmonary arterial hypertension (PAH) is a entity of severe cardiovascular disease which eventually leads to right heart failure and death due to pulmonary vasculature remodelling. Almost 45% of patients with PAH are iron deficient.

Aims And Objectives:

- To study the right ventricular systolic pressure in severe anaemia pre and post transfusion

MATERIALS AND METHODS:

A Hospital-based cross-sectional study was conducted in the Department of General Medicine Dr PSIMS & RF Medical College, and Hospital for six months after approval from the Hospital Ethics and Research Committee.

Duration Of Study: From July 2021 to December 2021

Sample Size: 33

Methods Of Data Collection:

- All the selected cases of fulfilling the inclusion criteria, were taken for study after taking prior informed consent.
- Information is collected through a pre-structured proforma for each study subject
- The study was carried out on patients with severe anaemia
- Qualifying study subjects will be undergoing detailed history, clinical examination, and laboratory investigations.

Sampling Technique: Simple Random Sampling

Inclusion Criteria:

- Patients with age more than 14 years
- Patients who are willing to participate and give informed written consent.

Exclusion Criteria:

- Age less than 14 years

Data Analysis:

- Data was collected using a pretested proforma meeting the study's objectives. Detailed history, physical examination, and necessary investigations were undertaken.
- The chi-square and Fisher's Exact test were used in statistical analysis to compare proportions. At a P-value of 0.05, statistical results were considered significant <0.01.

RESULTS:

Age	Frequency	Percentage
<=30	8	24.2
31-40	6	18.2
41-50	9	27.3
51-60	3	9.1
>60	7	21.2
Total	33	100.0
Mean ± SD	44.48±15.91	

Sex	Frequency	Percentage
Male	9	27.3
Female	24	72.7
Total	33	100.0

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Venous HUM		Frequency		Percentage	
Absent		14		42.4	
Present		19		57.6	
Total		33		100.0	
Venous HUM	HB			t value	P value
	N	Range	Mean \pm SD		
Absent	14	5.3-7	6.45 \pm 0.56	5.19	<0.001*
Present	19	2.3-6.6	4.34 \pm 1.44		

Using Independent T Test

Variables	Pearson's Correlation	P value
HB	-0.22	0.2
Ferritin		
HB	-0.52	0.002*
RVSP		
Ferritin	0.05	0.7
RVSP		

Using Pearsons Correlation

FERITTIN	HB			t value	P value
	N	Range	Mean \pm SD		
Abnormal	25	2.3-6.7	5.01 \pm 1.45	-1.49	0.2
Normal	8	3.1-7	5.94 \pm 1.76		

Using Independent T Test

RVSP	HB			t value	P value
	N	Range	Mean \pm SD		
Abnormal	16	2.3-6	4.35 \pm 1.45	-3.76	0.001*
Normal	17	2.3-7	6.07 \pm 1.15		

Using Independent T Test

DISCUSSION

Pulmonary arterial hypertension (PAH) is a heterogeneous entity which is characterised by a sustained increase in pulmonary artery pressure (>25 mmHg) and normal pulmonary capillary wedge pressure (<15 mmHg) with a normal or reduced cardiac output. Anaemia reduces tissue oxygen delivery and causes a compensatory cardiovascular response. In chronic anaemia, the heart undergoes both structural and functional changes in response to the reduced haemoglobin and is accompanied by increased cardiac muscular mass. Adaptation to an anaemic state involves increase in the cardiac index and stroke volume. This overall increase in sympathetic and inotropic activity places extra stress on the myocardium, perhaps leading to remodelling of the cardiac myocytes and pulmonary vasculature. Coronary blood flow in anaemic patients have shown a decrease in myocardial oxygen consumption despite an increase in myocardial workload. In anaemia, there is decreased afterload due to vasodilatation and reduced vascular resistance as a consequence of low blood viscosity. With decreased afterload, the venous return (preload) and left ventricular (LV) filling increase, leading to increased LV end-diastolic volume and high stroke volume. High stroke work is also due to enhanced LV contractility attributed to increased concentrations of catecholamine's and non-catecholamine factors. In addition, heart rate is increased in anaemia, due to hypoxia-stimulated chemoreceptors and increased activation of sympathetic nervous system. These haemodynamic changes lead to gradual development of cardiac enlargement and LV hypertrophy (LVH). The LVH is eccentric, characterized by increased LV internal dimensions and a normal ratio of wall thickness to cavity diameter. When anaemia-related LVH develops in an otherwise 'healthy' environment, the lesions are reversible and the type of LVH is primarily physiological and is not associated with impaired diastolic function. It does so by mimicking the pulmonary effects of hypoxia through stabilization of hypoxia-inducible factor, which is a transcription factor that regulates genes that provide compensation for hypoxia, including vascular endothelial growth factor. Iron chelation in humans mimics the increase in PA pressure with acute hypoxic exposure, suggesting a protective role for iron against pulmonary vasoconstriction.

CONCLUSION:

- Among the selected patients, most patients were belonging to the age group of 41-50 years (27.3%).
- Most females were suffering from severe anaemia (72.7%).
- Most subjects in the group were iron deficient (51.51%).
- Majority of patients are with mild pulmonary hypertension (62.5%), followed by moderate hypertension (25%).
- Decrease in RVSP is observed in 90% of cases after PRBC transfusion.